

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PEST MANAGEMENT

(acre)

Code 595

DEFINITION

Managing agricultural pest infestations including weeds, insects, and disease to reduce adverse effects on plant growth, crop production and environmental resources.

PURPOSES

This practice is applied as part of a total resource management system to:

- manage pest impacts on sustainability and profitability of agricultural activities.
- manage pests that cause aesthetic losses or which create inconvenience, annoyance or health problems.
- eliminate or minimize negative effects of pest management on soil, water, air, plant and animal resources.
- eliminate negative effects of pest management on human resources.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland and other agricultural land uses where pest control is needed.

CRITERIA

The following criteria are applicable to all purposes named above and are options that should be considered when managing pests.

GENERAL INTEGRATED PEST MANAGEMENT

PRINCIPLES

1. Promote tolerance to pests by providing plants with proper nutrients, water, pH and soil conditions that favor rapid establishment and vigorous growth.

2. Select plant varieties resistant to pests and adapted to growing seasons and hardiness in respective areas of the state. **Varietal Trials of Selected Farm Crops**, annually published by the Minnesota Agricultural Experiment Station-University of Minnesota, can be consulted for information on hardiness and resistance to certain pests.

3. Adjust planting dates to optimize plant competition with weeds; minimize insect infestations and help manage other pest problems.

4. Scout fields to properly identify pest conditions and beneficial organism activity.

5. Assess pest population levels, including information on stage(s) of development and potential for damage.

6. Determine stage of crop growth and plant condition when evaluating the need for, timing and effectiveness of post-emergence pest controls.

7. Observe other conditions such as fertility problems and soil compaction that may influence need for and type of control.

8. Consider economic injury levels(EIL) and economic treatment thresholds when determining if control is necessary. EILs for certain pests and crops are available from the Minnesota Extension Service.

9. Select appropriate control techniques considering effectiveness, cost, and environmental impact. Control techniques include cultural, biological, chemical and mechanical. An effective pest management program may include some aspects of one or all of these techniques.

10. Evaluate the effectiveness of the alternatives selected.

11. Keep field records of pest control activities and pest populations. Field records include:

- soil test results
- crops
- pest problems

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Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

- controls applied
- date control applied
- results

When using pesticides also include:

- brand names
- EPA registration number
- active ingredients
- rates

ADDITIONAL CULTURAL INTEGRATED PEST MANAGEMENT PRINCIPLES

1. Use disease and weed free seed to prevent disease and weeds from being introduced.
2. Rotate crops with different life cycles, growth habits and tolerance to weeds, insects and diseases.
3. Increase ability of crops to compete with weeds by using higher plant population density, narrow row spacing and varieties with dense rapid growth.
4. Use companion crops, cover crops and crop residues, when appropriate, to suppress weed growth.
5. Use crop cultivation and shallow tillage operations to control annual and biennial weed seedlings.
6. Mow early enough to prevent reseeding of weeds and to have maximum impact on perennial weed root carbohydrate reserves.
7. Utilize timely harvest schedules to control weed seed production or minimize losses from diseases and insect.
8. Use clean feed supplies for livestock to prevent spreading seed.
9. Control reinfestation sources of weeds on adjacent property such as fencerows, ditch banks, and roadways. Take care to avoid damage to non-target organisms and threatened or endangered species.
10. Use good sanitation practices to remove soil, crop residues, weed seeds and diseases from equipment prior to moving to other fields.
11. Use hand weeding methods for small weed infestations.

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12. Control alternative host plants of insects and diseases.
13. Use tillage practices to bury diseased crop residues when appropriate. **This may increase soil erosion.**
14. Consider disease potential when selecting planting sites, dates and rates.
15. Carefully manage irrigation water applications to minimize optimum moisture conditions for disease development.

ADDITIONAL BIOLOGICAL INTEGRATED PEST MANAGEMENT PRINCIPLES

1. Consider biological control methods that have been proven effective to control perennial weeds, insects and diseases. A few biological control methods are available for use in Minnesota.
2. Protect natural enemies of insect pests.
3. Utilize natural enemies or their products.

ADDITIONAL PESTICIDE INTEGRATED PEST MANAGEMENT PRINCIPLES

1. Selection Criteria

Selection of a product should be made based on several factors. Factors to consider are:

a. Product Effectiveness.

The Univ. of Minn./Mn. Extension Service annually publishes bulletins describing the effectiveness of various pesticides to control their intended pest (e.g. **Cultural and Chemical Weed Control in Field Crops**, or **Insecticide Suggestions to Control Insect Pests of Field Crops**).

b. Non-Target Species Impacts.

Minnesota Extension Service (MES) **Pesticide Applicator Training Manual Category A General Ground** contains general recommendations on protecting non-target organisms including Minnesota's threatened or endangered species. Use pesticide control options which minimize impacts on beneficial, threatened or endangered species.

c. Possible Toxicological Risk Associated with Pesticide Exposure.

USDA - Natural Resources Conservation Service (NRCS) **Field Office Technical Guide (FOTG) Section II (Water Quality and Quantity Interpretations), Part A (Selected Pesticides Properties Database)** contains information on a number of pesticides.

d. Pesticide and Site Characteristics Affecting Off-Site Movement of Chemicals.

Pesticide characteristics which minimize potential to move off-site into ground or surface waters include low water solubility, short half-life, and attraction to soil and organic matter particles. Site characteristics which affect chemical movement include soil texture, permeability, and organic matter; depth to water table; proximity to surface waters; and climatic and watershed characteristics affecting runoff and leaching. **NRCS Field Office Technical Guide (FOTG) Section II (Water Quality and Quantity Interpretations), Part A (Selected Pesticides Properties Database) and Part B (Soils Leaching and Runoff Ratings)** contain information on relative soil potential to retain chemicals on-site; relative chemical potential to move off-site; and a procedure which considers the combined affects of soil and pesticide characteristics on off-site movement. These tables and procedure will be used by NRCS staff to help determine the relative potential of a given chemical on a given soil to move off-site.

e. Preventative or Post-infestation management.

Pest management can be preventative, that is applying the control measures BEFORE the type or level of pest infestation is known. Or it can be applied once the pest has expressed itself and can be assessed as to species and level of occurrence (post infestation). Thresholds, when available, can be used to determine the need to apply control measures. The most appropriate control can be determined from available options once the pest has expressed itself.

A comparative example is to use soil applied herbicides before weeds have emerged (preventative), or waiting for weeds to emerge, assessing the species and population present, and then selecting control options which may include cultivation or a more selective herbicide application (post-infestation).

- Preventative

Use pre-emergence or preplant incorporated herbicides to manage weeds where high annual weed populations are known to exist.

Use soil applied insecticides where the potential for high levels of an insect are known to exist.

Use appropriate fungicides to protect the host plant prior to infection if conditions are conducive for infection.

Use seed treatments when appropriate.

- Post-infestation

Use post-emergence herbicide applications where know populations exist or if uncertain of potential weed pressures.

Identify insect pest and assess economic injury levels prior to application.

Use eradicant fungicide when appropriate.

f. Other selection considerations.

- When using pesticides select the correct pesticide and rate for the pest spectrum present.
- Consider soil texture, organic matter and soil pH when selecting soil applied pesticides and application rates.
- When pesticides are used, efforts should be taken to minimize pest resistance by (a) rotating pesticides used, (b) using premixes or tank mixes which include more than one mode of action, and (c) avoiding repeated use of pesticides having similar modes of action.

2. Application Criteria

a. Always read and follow label instructions.

b. Properly calibrate equipment before mixing and loading pesticides at the beginning of each season and any time nozzle type is changed. Replace worn nozzle tips, cracked hoses and faulty gauges.

- c. Apply uniformly across the target area except in situations where variable rate technology is being used.
- d. Utilize the lowest appropriate rate to minimize pest resistance.
- e. Band apply or spot treat where appropriate.
- f. Ensure that the pesticide applicator knows the exact location of the area to be treated and the potential hazard of spray drift or subsequent pesticide movement to surrounding areas.
- g. Avoid spray drift.
- h. Incorporate herbicides when appropriate to reduce the risk of poor performance under dry conditions.
- i. Incorporate pesticides in general to minimize surface runoff if product performance can be maintained; product label guidelines allow incorporation; and excessive erosion will not result from incorporation tillage.
- j. Time application in relation to present soil moisture, anticipated weather conditions and irrigation schedules to achieve the greatest product performance and reduce potential for offsite transport. This includes timing herbicide applications to avoid high energy rainfall shortly after application.
- k. Time post-emergence herbicide applications according to weed growth stage and to minimize potential for drift.

MIXING AND LOADING PESTICIDES

1. Always read and follow label directions.
2. Inventory pesticides with Material Safety Data Sheets and develop a pesticide emergency plan.
3. Properly locate chemical mixing and equipment rinsing stations to minimize potential for ground or surface water contamination from spills and to minimize potential to contaminate the mixing and loading area. Consult Minnesota Extension Service **FARM*A*SYST Worksheet 2 and Fact Sheet 2** for further guidance.

4. Use an impervious surface for loading/mixing, equipment clean-out and storage. Use extreme care and follow loading and mixing procedures.
5. When possible use a closed handling system for mixing and loading.
6. Do not mix pesticides or load or clean application equipment near wells. Follow the Minnesota Water Well Code for safe separation distances between wells and pesticide use activities.
7. Avoid mixing, loading, or equipment cleaning within 150 feet from a sinkhole (outer edge of slope), streambed, lake, wetland, water impoundment, river or similar area.
8. Prevent backsiphoning of pesticides into wells (including irrigation wells) and other water supplies by utilization of a fixed airgap or other Minnesota Department of Agriculture/ Minnesota Department of Health approved anti-backsiphoning device.
9. Use a nurse tank to fill or rinse equipment in the field away from the well.
10. Clean application equipment when switching to incompatible products or crops as well as at the end of the use season.

CONTAINER AND WASTE PESTICIDE MANAGEMENT

Minnesota Extension Service Pesticide Applicator Training Manual Category A General Ground contains information on container and waste pesticide management.

1. Follow label storage instructions.
2. Purchase only the amount of pesticide needed for the job.
3. Store pesticides only in the original labeled container, separated from other products such as food, feed and seed and in a locked building having appropriate warning signs.
4. Pressure rinse or triple rinse containers immediately after emptying. Delay in rinsing pesticide containers may result in a residue that, upon drying, is highly

resistant to rinsing. Use rinsate as dilution make-up water and apply evenly over a labeled site.

5. Recycle triple rinsed or pressure rinsed rigid plastic containers through the Empty Pesticide Container Collection and Recycling Program.

6. Completely empty pesticide containers before disposing of them. Empty and residue free paper bags, plastic bags and other types of containers can be disposed of at sanitary landfills.

7. Do not burn any pesticide container in an open fire, such as in the field, in trash barrels or burn piles. This is an illegal act in Minnesota.

8. Do not reuse pesticide containers unless they are dedicated or have been cleaned according to pesticide manufacturer's protocol and are intended to be refilled with pesticides.

9. Dispose of unusable or unwanted pesticides according to local, state and federal regulations. The MDA has an on-going program of Waste Pesticide Collection which is free to most participants (Call MDA for additional details at 612/297-1062 or 1/800-657-3986.)

SAFETY AND LEGAL REQUIREMENTS

SAFETY

Minnesota Extension Service Pesticide Applicator Training Manual Category A General Ground contains in-depth recommendations on protecting applicators, mixers or loaders from exposure to pesticides.

1. Minimize exposure to pesticides during mixing, loading, cleaning, and applying. Always read the pesticide label for information on required personal protective equipment.

2. Wash affected areas after possible dermal exposure and remove personal protective equipment prior to eating, drinking, or smoking. Bathe at the end of the day or after completion of application.

3. Wash and dry personal protective equipment and store separately from other laundry. Wash clothes exposed to pesticides separately from other laundry.

4. Know what to do in case of accidental pesticide exposure. Provide emergency wash stations for personnel exposed to pesticides, and formulate a safety plan complete with information about locations of emergency treatment centers for personnel exposed to pesticides.

5. Know what to do in case of pesticide poisoning. Have a pesticide first aid kit readily available. Check the product label for instructions and call the nearest poison center in the event a pesticide is swallowed.

Minnesota Regional Poison Center
Greater Minnesota and East Metro
(612) 221-2133 or 1-800-222-1222

Hennepin County Regional Poison Center West Metro
(612) 347-3141

LEGAL REQUIREMENTS

1. Read and follow all directions and precautions appearing on or with the pesticide containers. In addition to the label, Best Management Practices (BMPs) should be considered when making pesticide application decisions. BMP recommendations are generally voluntary however, certain management practices may be mandatory if the product label or state pesticide rules or laws so direct.

2. Follow product label directions and local, state and federal regulations regarding posting and field reentry restrictions for treated areas.

3. Applicators of Restricted Use Pesticides must become a certified pesticide applicator and have a proper Minnesota Department of Agriculture issued license or certification.

4. Persons planning to apply pesticides through an irrigation system must obtain a chemigation permit through the Minnesota Department of Agriculture. Pesticides used in chemigation shall be labeled for this method of application. All chemigation systems must be fitted with effective antisiphon devices or check valves to prevent backflow into water supplies, as detailed in local and state regulations.

5. Control spray drift. It is illegal to allow spray drift to move off the target site.

6. Follow all local, state and federal regulations regarding the transport of pesticides.

INCIDENT RESPONSE

1. Report all agricultural chemical incidents to the state duty officer at 1-800-422-0798 (Greater Minnesota) or 1-612-649-5451 (twin cities metropolitan area).

2. Become familiar with basic emergency response procedures for agricultural chemical spills. This information can be obtained from the MDA incident response guidance documents and training materials, or from training courses offered by the Minnesota Extension Service and other organizations.

OTHER CONSIDERATIONS

GROUND WATER SENSITIVITY

Certain areas of Minnesota have high natural potential for leaching of materials to ground water. Pesticide use must be critically reviewed in these areas to determine if it is possible to use pesticides and still protect groundwater quality. Sensitive areas include:

1. Areas indicated as having high geologic sensitivity in completed County Geologic Atlases or regional Hydrogeologic Assessments. The County Geologic Atlas sensitivity ratings, Regional Hydrogeologic Assessment sensitivity ratings and Preliminary level 1 soils sensitivity ratings are generalized ratings not developed for any particular material or chemical.
2. Areas identified by Comprehensive Local Water Plans as sensitive aquifer recharge areas.
3. Areas identified in Community Wellhead Protection Plans as needing special protection.
4. Alluvial soil containing sand lenses along river bottoms (common in Southeastern Minnesota).
5. Exposed surficial outwash aquifers common in Southcentral and Southwestern Minnesota in and along intermittent and perennial drainageways.
6. Shallowly buried or exposed fractured rock aquifers common in Northeastern and Southeastern Minnesota and areas of Southcentral and Southwestern Minnesota where shallowly buried fractured Sioux Quartzite

aquifers are used as a drinking water source (e.g. Red Rock Ridge area in Cottonwood County).

7. Sandy areas where the prevalent surface soil texture or subsoil texture (within three feet of the surface) is coarser than very fine sandy loam and the high water table is less than 30 feet below the surface.

a. Prevalence will vary by site dependent on continuous nature of the soil mapping unit; use of shallow aquifers as a drinking water source; and planner and landowner or occupier objectives.

10% may be critical in some cases. However an entire area should be considered susceptible to leaching if at least 33% sandy soils are present either in the surface soil or subsoil as defined above.

b. Textures that are coarser than very fine sandy loam include sand, loamy sand, loamy coarse sand, fine sand, loamy fine sand, loamy very fine sand, coarse sand, very fine sand, sandy loam, coarse sandy loam, fine sandy loam or any of the above textures with gravelly or very gravelly modifiers.

All counties in Minnesota may contain one or more sensitive areas.

CONSERVATION PRACTICES

1. Install erosion and runoff control measures to minimize offsite movement of pesticides.
2. Follow proven irrigation management practices to minimize leaching. Do not over irrigate. University of Minnesota Extension Service Irrigation specialists can be consulted for irrigation recommendations.
3. Establish vegetated buffer areas which separate normal crop production activities from sensitive features such as grassed waterways, sinkholes, wells including drainage wells and tile inlets or outlets, streams and lakes.
4. When possible avoid pesticide applications on or pesticide drift into the above mentioned features including vegetative buffers designed to protect these features.

PLANS AND SPECIFICATIONS

Site specific pest management plans will be developed based on principles contained in this standard and in Minnesota Amendment MN6 to USDA-NRCS National Planning Procedures Handbook(NPPH) 180-VI.

Plans for chemical handling including storage, mixing, loading, cleaning, accidental exposure and spill incidences will be developed by the responsible entity based on local, state and federal regulations.

OPERATION AND MAINTENANCE

Operation and maintenance of pesticide handling and storage equipment shall be developed based on local, state and federal regulations and with guidelines contained in the MIXING AND LOADING PESTICIDES, CONTAINER AND WASTE PESTICIDE MANAGEMENT, AND SAFETY AND LEGAL REQUIREMENTS sections of this standard

REFERENCES

Univ. of Minnesota/MN. Ext. Service Publications:

AG-FO-0815 Herbicide Spray Drift

AG-FO-6122 Chemigation Safety Measures

AG-BU-0500-E Insecticide Suggestions to Control Insect Pests of Field Crops.

AG-BU-3157 Cultural and Chemical Weed Control in Field Crops.

AG-FS-3771-A Rinsing Pesticide Containers

AG-FS-0915 Pesticide Application Record

AG-FS-3885 How to Calculate Herbicide Rates and Calibrate Herbicide Applicators

AG-FS-3947 Understanding Pesticide Toxicity

BU-3832-S Herbicide Mode of Action and Injury Symptoms

Pesticide Applicator's Training Manual-Category A - General Ground

AG-PC-5696-S. 1991. FARM*A*SYST (Farmstead Assessment System). Fact Sheet 2. Reducing the Risk of Groundwater Contamination by Improving Pesticide Storage and Handling.

FARM*A*SYST Worksheet #2 Assessing the Risk of Groundwater Contamination from Pesticide Storage and Handling.

North Dakota State University Extension Service
A-657(Revised) Herbicide Spray Drift

Minnesota Department of Agriculture publications:

Storing Empty Pesticide Containers for Recycling.

Helping Farmers and Others Dispose of Waste Pesticides.

Waste Pesticide Collection Program Questions and Answers.

Minnesota Department of Natural Resources Division of Forestry publications:

Protecting Water Quality and Wetlands in Forest Management - Best Management Practices in Minnesota.

University of Wisconsin Cooperative Extension Service publications:

A3547 Scouting Corn - A guide for Wisconsin corn production

A3563 Reduced Herbicide Rates: Aspects to Consider

A Simple Technique for Predicting Future Weed Problems

USDA-Natural Resources Conservation Service- Minnesota publication:

Field Office Technical Guide (FOTG) Section II (Water Quality and Quantity Interpretations), Parts A (Selected Pesticides Properties Database) and B (Soils Leaching and Runoff Ratings)